

## AP Stat- Worksheet 2.6C- Independence

1. A study was made to compare year in high school with preference for vanilla or chocolate ice cream with the following results.

	Vanilla	Chocolate	
Freshman	20	10	30
Sophomore	24	12	36
Junior	18	9	27
Senior	22	11	33
	84	42	126

- a. Calculate the marginal distribution for year in school

<u>Fr</u>	<u>So</u>	<u>Jr</u>	<u>Sr</u>
23.81%	28.57%	21.43%	26.19%

- b. Calculate the marginal distribution for flavor preference

<u>V</u>	<u>Choc</u>
66.67%	33.33%

- c. Calculate the conditional distributions for each year in school. What do you notice? Where have you seen these numbers before?

	<u>Fr</u>	<u>So</u>	<u>Jr</u>	<u>Sr</u>
V	66.67%	66.67%	66.67%	66.67%
C	33.33%	33.33%	33.33%	33.33%

- d. Calculate the conditional distributions for the two flavors. What do you notice? Where have you seen these numbers before?

<u>V</u>	Fr 23.81%	Jr 21.43%
<u>C</u>	So 28.57%	Sr 26.19%

This is known as INDEPENDENCE.

INDEPENDENCE = When one variable does not affect the other variable

How do we tell if two variables are independent?

- If their marginal and conditional distributions match.

2. An organization is concerned about the number of new employees that leave before they finish a year of work. So they predict whether the employee will stay by giving them a specific standardized test. Below are the results comparing the test prediction and the actual result.

	Actually stay	Actually leave	
Predicted to stay	63	12	75
Predicted to leave	21	4	25
	84	16	100

- a. Of those employees that are predicted to stay, what proportion actually left?  $\frac{12}{75} = 16\%$
- b. Of those employees predicted to leave, what proportion actually left?  $\frac{4}{25} = 16\%$
- c. Is an employee that is predicted to stay any more likely to leave than an employee predicted to leave?  
No!

- d. Find the marginal distribution for Prediction

$$P.S. = 75\%$$

$$P.L. = 25\%$$

- e. Find the marginal distribution for Actual result

$$A.S. = 84\%$$

$$A.L. = 16\%$$

- f. Find the conditional distribution for Prediction.

		AS	AL
Pred:	Stay	84%	16%
	Leave	84%	16%

- g. Find the conditional distribution for Actual result.

		PS	PL
Actual	Stay	75%	25%
	Leave	75%	25%

- h. Are the two variables independent?

yes! marginal & conditional distributions match